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Travel Model Validation
- Key Considerations -

Presented to
Iowa DOT Peer Review
31 March 2004

Summary

- **Some Important Elements in Successful Validation**
- **Experience in Anchorage**
  - **Process Goals**
  - **Process Tools**
  - **Key Findings**
- **Conclusions**

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Building a Good Validation Vehicle

- **Good Input Data**
- **The Right Engine (Travel Model Design)**
- **Validation/Process Tools**
- **Appropriate Targets**
- **Emphasis on Strategic Value**

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Examples/Lessons from Anchorage

Model Characteristics
- TransCad based
- 6000+ Links/600+ Zones
- Walk, Bike,Driver,Pass,Bus Modes
- HBW,HBS,HBO,HBSC,NHW,NHB Purposes
- Integrated Freight Model
- Undergoing Peer Review

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Examples/Lessons from Anchorage

Area Characteristics
- 250K Population/100K Households
- 130-140K Employment
- Geographically Compact
- Employment Highly Decentralized
- Geographically Isolated
- Growing Problem of Congestion/Delays
- AQ Non-attainment (Ozone)

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Good Input Data

- CTPP Part 1 and Permit Data Used to Estimate Housing and Characteristics by Location
- Geocoded ES-202 Database Used to Estimate Employment by SIC Sector and Location
- 2002 Anchorage Household Travel Survey (12,093 trip samples)
- Previously Coded Networks/Link Data

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Good Input Data (?)

Residence and Housing

- Zone Boundary Differences (Model vs. CTPP)
- Direct Allocation from Census Block & Block Group
- Reconciliation with Local Control Totals (by Household Type)

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Good Input Data (?)

Employment
- Multi-Site Employer Allocation
- Geocoding Errors/Reconciliation
- Employment Sector Misallocation
- Specific Issues with Special Generators

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Good Input Data (?)

Travel Survey
- Linked Trip Representation
- Survey Reporting Issues
- Translation to TransCAD Triptables
- Specific Issues with Special Generators

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Good Input Data (?)

Highway Networks

- Representation of Limited Access Faciities
- Speeds & Turn Penalties
- Sparse Zone Centroid Links

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The Right Engine

Objectives

- Flexible Application of Model Steps
- Easy Access to Parameters/Settings
- Easy Update/Rerun of Model Chain
- Standardized Interface/Process
- Logging/Tracking of Operational Assumptions
- Easy Replication

The Right Engine

Implementation

- GISdk Script Based
- Straightforward Menu System
- Most Data in DBF Tables
- Open Execution Environment
- Integrated Reporting & Validation Table Generation
- Batch & Step by Step Operation

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Validation Process/Tools

- Traffic Count DB Linkage
- Screenline V/C Extraction & Reporting
- Facility Class V/C Extraction & Reporting
- Standardized Volume/Count Map Generation
- Matrix Marginal Tables

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Validation Process/Tools

- Uses Standard TransCAD Data
- Easy to Update
- Fully Integrated in Menus
- Automatically Updates Spreadsheets without Editing

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Building a Good Validation Vehicle

- Good Input Data
- The Right Engine (Travel Model Design)
- Validation/Process Tools
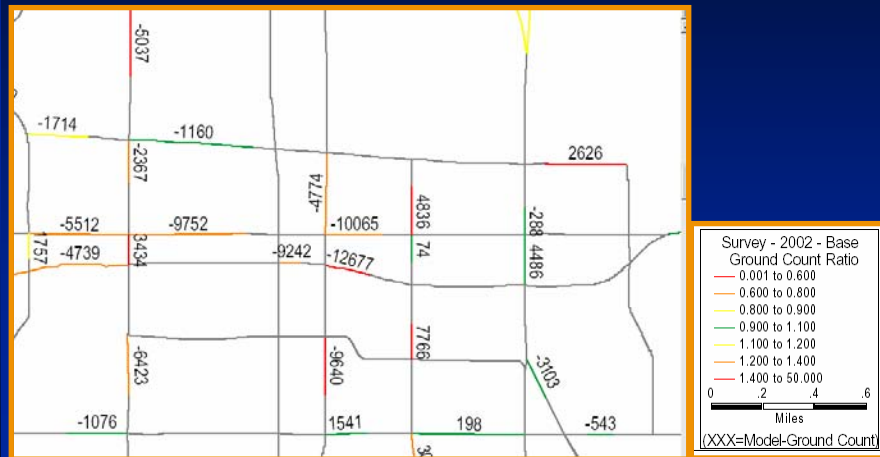- Appropriate Targets
- Emphasis on Strategic Value

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Screenline Reports

Screenlines.xls

Screenline	ID	ABCOUNT	BACOUNT	TOTCOUN	%TOTAL	ABVOL	BAVOL	TOTVOL	ABRATIO	BARATIO	TOTRATIO	TEST
N of Tudor Rd - Minnesota to Muldoon	101	137921	93633	231554	8.73%	123415	83124	206539	0.895	0.888	0.892	PASS
N of Dimond Av - Minnesota to Birch	201	135277	41357	176634	6.66%	112775	38464	151239	0.834	0.930	0.856	PASS
S of O'Malley - C St to Hillside	301	50427	27172	77599	2.93%	49646	20534	70181	0.985	0.756	0.904	PASS
S of Glenn Hwy - Ingra to Muldoon	401	63251	63215	126466	4.77%	71138	64437	135575	1.125	1.019	1.072	PASS
W of Muldoon - Tudor Rd to Glenn Hwy	501	73108	25578	98686	3.72%	80096	22160	102256	1.096	0.866	1.036	PASS
W of Boniface - Tudor Rd to Davis	601	89930	46700	136630	5.15%	107254	51012	158266	1.193	1.092	1.158	PASS
W of Birch - Rabbit Creek to Abbott	602	12065	12065	24130	0.91%	9835	9901	19736	0.815	0.821	0.818	PASS
E of Lake Otis - Tudor Rd to Commercial Rd	701	95135	95750	190885	7.20%	106804	103139	209943	1.123	1.077	1.100	PASS
E of Lake Otis - De Armoun to Dowling	702	25258	25258	50516	1.90%	24685	23774	48459	0.977	0.941	0.959	PASS
E of New Seward - Rabbit Creek to 3rd	801	141601	144606	286207	10.79%	139297	131749	271047	0.984	0.911	0.947	PASS
S of Dowling - Minnesota to Lake Otis	901	169622	56855	226477	8.54%	140883	58212	199095	0.831	1.024	0.879	PASS
S of Dimond - Minnesota to Birch	1001	90486	27811	118297	4.46%	68629	18834	87462	0.758	0.677	0.739	FAIL
N of Eagle River - Glenn Hwy	2001	12278	12321	24599	0.93%	13250	10059	23309	1.079	0.816	0.948	PASS
N of Eagle River Rd Access - Glenn to Birchwood	2002	1992	1992	3984	0.15%	1466	1827	3294	0.736	0.917	0.827	PASS
S of Hiland - Glenn Hwy	2003	48224	0	48224	1.82%	60093	0	60093	1.246	0	1.246	PASS
N of 3rd St - C St to Port Access	2005	3837	3837	7674	0.29%	2297	2801	5098	0.599	0.73	0.664	PASS
W of Ingra -3rd St to 15th	2006	34489	37103	71592	2.70%	29031	28422	57453	0.842	0.766	0.802	PASS
S of 9th - L St to Medfra	2007	62481	36121	98602	3.72%	44913	33923	78836	0.719	0.939	0.800	PASS
E of Ingra - 3rd to 15th	2008	33755	36989	70744	2.67%	25330	25414	50744	0.75	0.687	0.717	FAIL
N of Fireweed/Northern Lights - Minnesota to Muldoon	2010	76894	114362	191256	7.21%	86168	112384	198552	1.121	0.983	1.038	PASS
E of Northwood - Northern Lights to Int'l Airport	2013	46473	46531	93004	3.51%	41684	47199	88884	0.897	1.014	0.956	PASS
N of Int'l Airport - Spenard to Lake Otis	2014	158344	64515	222859	8.40%	145136	69290	214426	0.917	1.074	0.962	PASS
W of Minnesota - Raspberry to Klatt	2016	32831	33875	66706	2.52%	27490	27592	55083	0.837	0.815	0.826	PASS
S End of Study Area - Seward Hwy	2020	4480	4480	8960	0.34%	4279	5544	9824	0.955	1.238	1.096	PASS
Combined Screenline Totals		1600159	1052126	2652285	100.00%	1515594	989795	2505394	0.947	0.941	0.945	
* Note: All Counts Ending in "00" are estimated												

Summary / 101 / 201 / 301 / 401 / 501 / 601 / 602 / 701 / 702 / 801 / 901 / 1001 / 200

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Link Classification Reports

Classes.xls

Facility Class	CODE	ABCOUNT	BACOUNT	TOTCOUN	%TOTAL	ABVOL	BAVOL	TOTVOL	ABRATIO	BARATIO	TOTRATIO	TEST
Freeways	1	570105	25651	595756	12.68%	535251	19082	554332	0.939	0.744	0.93	
Expressways	2	103132	103797	206929	4.40%	131524	141327	272851	1.275	1.362	1.319	
Major Arterials	3	1256081	1339628	2595709	55.23%	1060804	1145457	2206261	0.845	0.855	0.85	
Minor Arterials	4	488357	494966	983323	20.92%	492541	498677	991219	1.009	1.007	1.008	
Collectors	5	139694	138086	277780	5.91%	108519	101968	210487	0.777	0.738	0.758	
Local Roads	6	8493	8493	16986	0.36%	5314	4971	10285	0.626	0.585	0.606	
On Ramps	7	5243	4142	9385	0.20%	7570	2107	9676	1.444	0.509	1.031	
Off Ramps	8	13183	0	13183	0.28%	10550	0	10550	0.8	0	0.8	
Frontage Roads	9	368	368	736	0.02%	411	404	815	1.117	1.097	1.107	
All Facility Classes		2584656	2115131	4699787	100.00%	2352484	1913993	4266476	0.910	0.905	0.908	
FHWA Evaluation Criteria												
Freeways	+/- 7%	570105	25651	595756	0.126762	535251	19082	554332	0.939	0.744	0.930	FAIL
Expressways/Major Arterials	+/- 10%	1359213	1443425	2802638	0.596333	1192328	1286784	2479112	0.877	0.891	0.885	FAIL
Minor Arterials	+/- 15%	488357	494966	983323	0.209227	492541	498677	991219	1.009	1.007	1.008	PASS
Collectors	+/- 25%	139694	138086	277780	0.059105	108519	101968	210487	0.777	0.738	0.758	PASS

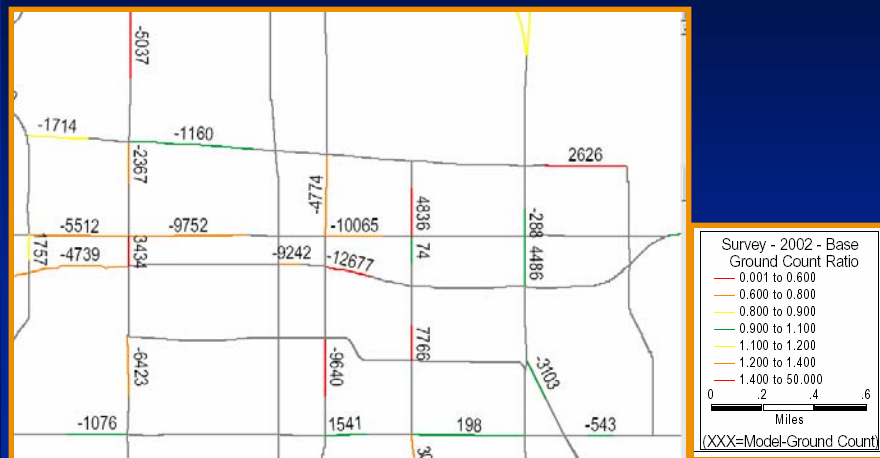Summary / Class1 / Class2 / Class3 / Class4 / Class5 / Class6 / Class7 / Class8 / Cl

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Volume/Count Maps

Volume/Count Maps

Appropriate Targets

- Continuous Process
- Use Independent Data Sources
- Focus Validation Effort
- Opportunity to Find Data & Process Errors

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Appropriate Targets

Household/Employment Allocation
- Survey Sample vs. CTPP Part 1
- ES-202 vs. CTPP Part 2
- Verification with Employers
- SIC vs. NAICS Sector Allocations
- Selected Field Checks

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Appropriate Targets

Trip Generation/Distribution/Mode Choice
Comparison to Land Use Based Rates (eg ITE)

CTPP Part 3 (Home Based Work)
– *Classified Trip Rates*
– *Average Trip Lengths*
– *District Level Trip Interchanges*
– *Selected Zone Interchanges*
– *Vehicle Occupancy Rates*

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Appropriate Targets

Traffic Assignment
- Screenlines
- Cut Lines
- Statistical Groupings
- Geographic Groupings
- Link Level Comparisons

[Starting Point is TMIP/NCHRP 255 Criteria]

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Appropriate Targets

Traffic Assignment
- Link Counts
- Turning Movement Counts
- Time Period Data
- Vehicle Occupancy Data/Surveys
- Travel Time Studies
- License Plate Surveys

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Emphasizing Strategic Value

- Validation Scale/Criteria Should Fit Application
- Design for the Future
- Standards are Guidelines
- Recognize Critical Locations/Issues
- Look for Causal Factors

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